

## ARAPAWA ISLAND – FLORA AND ECOLOGICAL NOTES

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### Introduction

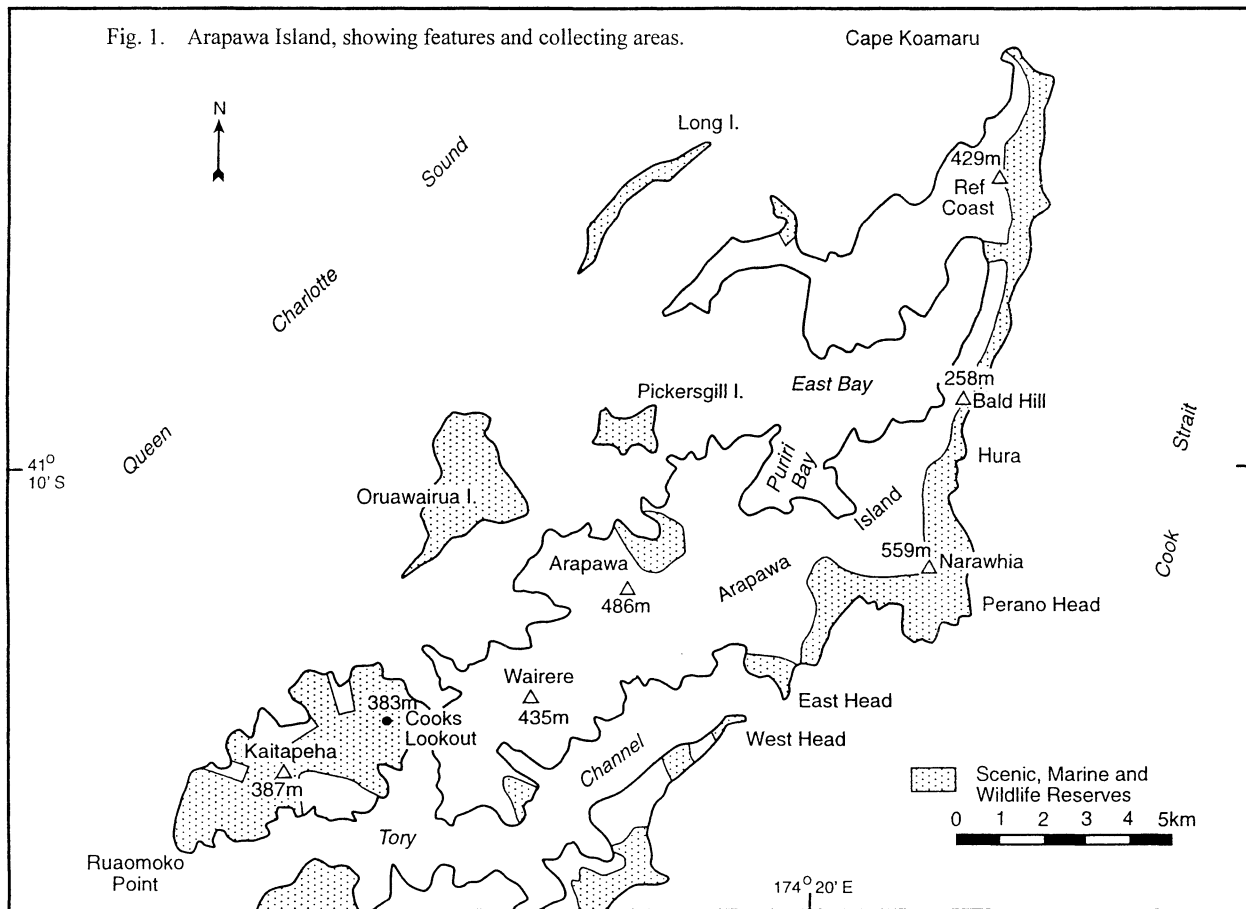
Arapawa Island (Fig. 1) faces Cook Strait at the entrance of Queen Charlotte Sound and is the second largest island in the Sounds Ecological District (about 7200 ha in area) with its highest elevation 559 m a.s.l. It has a mild, maritime, moist and windy climate. Mean sea-level air temperature is about 16°C in January/February, 8°C in July; for April, the period of the visit by CDM and JCW, it is about 13°C (NZ Meteorological Service, 1985a). Salt spray-laden winds are a major influence on the vegetation of exposed coasts.

The bedrock of Arapawa Island is indurated Mesozoic sandstone. The mild temperatures and moderate rainfall (rising from c. 1200 mm at sea level; NZ Meteorological Service, 1985b) and forest cover have caused development of brown soils, formerly referred to as lowland yellow brown earths (Soil Bureau, 1969; Hewett, 1992). Rain forest occurs on shady, steep or upper slopes (above 200 m) and grazed exotic grassland, fernland and reverting shrubland on the droughty, sunny, gentler slopes. These northwest-facing slopes have been heavily modified by a history of clearances, logging of native forests, burning, grazing and forestry. Several plantations of pine forest occur in the central and southern parts of the island. Alluvial fan, wetland, coastal rock, beach and tidal flats occur as local variants of substrate and vegetation.

The vegetation patterns of the Marlborough Sounds have been described by Whitaker *et al.* (1975), Walls (1984), Walls & Laffan (1986) (who also describe the soils), and Jane (1994). The units relevant to Arapawa are:

**Shore communities** of shrubs, tussocks, turfs, and low forbs;

Fig. 1. Arapawa Island, showing features and collecting areas.



**Valley flats, beaches, and fans** originally dominated by tall podocarps and hardwoods; this type was never common on Arapawa and is now represented only by scattered trees;

**Gullies and streamsides** are characterised by hardwoods, including native deciduous species, ferns, and vines;

**Lower hill slopes**

- kohekohe (*Dysoxylum*) forest near the coast, tawa (*Beilschmiedia*) increasing with elevation;
- beech (*Nothofagus*) forest of summit ridge crests and spurs;
- hinau (*Elaeocarpus*)-tawa-kamahi (*Weinmannia*) complex of high, wet, cool slopes, rich in ferns;
- mixed scrub and low forest of exposed ridges and faces with *Hebe 'arborea'* and *Hoheria populnea* var. *lanceolata*
- fire/grazing-induced scrub and grassland of *Ozothamnus* and *Olearia*.

Three sets of floristic and ecological notes are available for Arapawa Island. The first is Walls' (1984) survey of Scenic Reserves – they are largely confined to the southeastern and eastern forested steeplands at the north end of the island. Some additional records are available from subsequent visits by GYW. Secondly, there are field notes from the central western part of Arapawa, above and about Puriri Bay, compiled by CDM and JCW in 1993. Altitudinal ranges were recorded for most of the species and this has been supplemented with further information from GYW and GJ. Some basic site data were gathered from the main plant communities visited (Table 1) including soil pH (universal indicator field method). Finally, the Nelson Botanical Society visited Arapawa Island in 1994 and collected floristic data from the northern part of the island (Jane, 1994). It is therefore timely to collate this information from the various sources and derive some general patterns.

## Results

The list of plants (Table 2) is separated into five floristic categories: ferns and relatives, monocot herbs, dicot herbs, woody plants (trees, shrubs and vines), and some of the more prominent bryophytes and lichens. The table lists the three sets of data referred to above

with that of GYW being primarily from the southeastern forested reserves and those of CDM/JCW and GJ principally from the northwestern, more modified flanks, but including one of the largest blocks of native forest on this side, above Puriri Bay. The records of CDM and JCW are separated into seven elevational zones: **coastal**, 10-100 m, 100-200 m, 200-300 m, 300-400 m, 400-500 m, and on or near the summit (480-550 m). 'Coastal' refers to species confined to sites directly or regularly affected by exposure to salt water or spray such as salt marshes, beaches and coastal rocks. Naturalised species are distinguished by an asterisk and records of seedlings only are indicated by 'sd'. An 'x' entry refers to original records by the Nelson Botanical Society and records by GYW later than 1984 are indicated by 'o' entries.

From each of the broad habitats described above the following plant communities were sampled in mid April 1993 (Table 1): **Shore Communities** – grassland; **Fans** (minor in this study) and **Gullies** – grassland, hardwood forest and bush edge; **Lower to Mid Slope Forests** – podocarp forest, podocarp-hardwood forest, kamahi forest, and black beech forest; **Induced Grasslands and Shrublands** – heath shrubland and kanuka woodland. The mean sea-level air temperature of 13°C for April corresponds with the 10 cm ground temperatures recorded up to 100 m. Soil acidity was greatest at mid to high elevations where there has been most leaching from rainfall and under black beech or heathy and myrtaceous secondary shrublands, which have acid litter.

Records of 17 native bird species seen during the 1993 visit are reported. These and other wildlife or feral animal sightings (Table 3) complement the 33 bird records of Walls (1984). Giant landsnails (*Powelliphanta hochstetteri bicolor*, *Wainuia* sp.) are also seen commonly on the island although rodents and pigs no doubt take their toll.

A total of 502 vascular plants has been recorded (Table 2) with 202 species in the predominantly forested southeastern slopes and ridges and 493 species on the northwestern slopes and ridges, the latter inflated by the disturbed habitats and presence of large numbers of exotic herbaceous plants. About 20 of the total list are not certainly identified. Of the total flora, 150 (31%) are naturalised. There are about 75 ferns and allies (no exotic spp.), 128 monocot herbs (30% exotic spp.), 187 dicot herbs (58% exotics), and 112 woody plants (10% exotics).

Walls (1984) outlines the special or rare species found on this island which include: *Pseudopanax ferox*, *Sophora microphylla* form, *Hebe 'arborea'* and *Hoheria populnea* var. *lanceolata* all of which are localised in their distribution. Furthermore the 118 new records in Table 1 indicate other species that are local and largely found in open habitats which may diminish as regeneration and more thorough conservation management, or forestry, spreads across the island.

### Discussion and Conclusions

We include records from one of the largest forested areas on the western flanks of the island above Puriri Bay which Walls (1984) said “would make most valuable additions” to the reserves of Arapawa Island. Fortunately a large part of this forest area is owned by a non-profit trust which is managing it for its conservation values and has a QEII covenant on the block. It is important to have representative reserves from both sides of the island as there are over 100 indigenous spp. apparently confined to the northwestern side of Arapawa, although less than 20 spp. are confined to the southeastern flanks. This may partly reflect the effort available for the surveys and the relative inaccessibility of the eastern side.

All parts of the island have had a history of quite heavy browsing by pigs, goats, sheep and cattle and this has undoubtedly affected the understorey density and regeneration; possums have not yet been introduced. Some feral animal control is exercised by the Department of Conservation in accord with older management plans (Lands & Survey, 1981), but it would be desirable to eventually eliminate non-domestic stock from the island because of its large size and possum-free status. This would result in substantial conservation gains. It should be noted that most of the population of the celebrated Arapawa goats are confined within a supposedly secure private landholding on the island. As a note of caution, it should not be assumed that simply removing grazers from the open western slopes will maintain or enhance the local biodiversity, as some of the small forbs would probably disappear as the taller native and exotic vegetation regenerated. Grazing or browsing will also control some weeds such as wilding pines and tall exotic grasses. The exotic shrubs such as gorse, Spanish heath and broom, would in time become overtopped by native trees, but *Clematis vitalba* will need to be watched. Some shade-tolerant weeds seem not to be

on the island – blackberry, barberry, holly, ivy – and these should be held out or controlled as soon as they appear.

### References

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**Table 1: Site data where plant samples were obtained in six altitudinal zones.**

Data gathered in April 1993; hd - hardwood; pod - podocarp

Climate & Soil	Coast	-100	-100	-200	-300	-500	-500	-500	Summit
Altitude (m)	2	15	50	215	300	470	485	495	550
Soil pH	7	7		5	4	5.8			4.5
					4.5 in litter				
Vegetation	grass	hd forest	edge	heath	kanuka	beech	pod	kamahi	pod-hd

**Table 2: Plant species lists**

Symbols: \* - naturalised spp.; sd - seedlings only; r - rare; x - present to common; NBS - Nelson Bot Soc  
o - new record since GYW (1984) and/or not part of CDM/JCW (1993) records

Species	Walls	NBS	Records of Meurk & Ward 1993					Summit
	1984	1994	Coast	-100	-200	-300	-400	
<b>Ferns, Lycopods, Psilophytes</b>								
<i>Adiantum cunninghamii</i>	x	x	x	o				
<i>Anarthropteris lanceolata</i>		o					o	
<i>Arthropteris tenella</i>		o	o	o				
<i>Asplenium bulbiferum</i>	x	x		o			x	x
<i>A. colensoi</i>		o			o			
<i>A. flabellifolium</i>	x	x					o	
<i>A. flaccidum</i>	x	x		x			o	x
<i>A. hookerianum</i>	x	x			o		x	
<i>A. oblongifolium</i>	x	x			o			x
<i>A. obtusatum</i>		x	o			x	x	
<i>A. polyodon</i>	x	x			o			x
<i>A. terrestre</i>		x	o				x	x
<i>Blechnum blechnoides</i>	x	x	o					
<i>B. chambersii</i>	x	x		x			x	x
<i>B. discolor</i>	x	x					x	x
<i>B. filiforme</i>	x	x		x			x	x
<i>B. fluviatile</i>	x	x	x				x	x
<i>B. montanum</i>		x		x				
<i>B. nigrum</i>	x			o				
<i>B. novae-zelandiae</i>	x	x		x				
<i>B. penna-marina</i>	x	x				x	x	
<i>B. procerum</i>	x	x				x	x	x
<i>B. vulcanicum</i>		x	o			x	x	
<i>Botrychium</i> sp.				x			x	
<i>Cheilanthes humilis</i>	x	x						
<i>Ctenopteris heterophylla</i>	x	x						
<i>Cyathea dealbata</i>	x	x		o		x	x	x
<i>C. medullaris</i>	x	x	x	x				x
<i>C. smithii</i>	x	x					o	x
<i>Dicksonia squarrosa</i>		x	x	o			x	x
<i>Diplazium australe</i>	x	x	o					
<i>Doodia caudata</i>	x			o				
<i>Grammitis billardierianum</i>		o						
<i>G. ?patagonica</i>						x		
<i>Histiopteris incisa</i>	x	x					x	x
<i>Hymenophyllum cupressiforme</i>		o						
<i>H. demissum</i>	x	x		o	o		o	

Species	Walls		NBS		Records of Meurk & Ward 1993				
	1984	1994	Coast	-100	-200	-300	-400	-500	Summit
<i>H. dilatatum</i>	X	X					X	X	X
<i>H. flexuosum</i>		O		O			O		
<i>H. minimum</i>		O	O						
<i>H. multifidum</i>		X							X
<i>H. peltatum</i>		O					O	O	
<i>H. rarum</i>	X	X							X
<i>H. revolutum</i>		X		O	O		O		X
<i>H. sanguinolentum</i>	X	X					O	X	
<i>H. villosum</i>		X							X
<i>Hypolepis ambigua</i>	X	X	X	X					
<i>H. distans</i>		O							
<i>H. rufobarbata</i>	X	X					X	X	X
<i>Lastreopsis glabella</i>		O		O	O	O			
<i>L. hispida</i>	X	X				O	O		
<i>L. velutina</i>	X	X	O	O					X
<i>Leptopteris hymenophylloides</i>	X	X	O	O			O		
<i>Lindsaea trichomanoides</i>	X	X					X		
<i>Lycopodium cf fastigiatum</i>	X						O		
<i>L. varium</i>	O	X							
<i>L. volubile</i>		O							
<i>Ophioglossum coriaceum</i>	X	X		X			X		X
<i>Paesia scaberula</i>	X	X		X	O	O	X	X	
<i>Pellaea rotundifolia</i>	X	X	O	X	O	O		X	X
<i>Phymatosorus pustulatus</i>	X	X		O			O	O	
<i>P. scandens</i>	X	X	O	O					
<i>Pneumatopteris pennigera</i>	X	X	X	X			X		
<i>Polystichum richardii</i>	X	X		O			X	X	X
<i>P. vestitum</i>	X	X	X		X	X	X		X
<i>Pteridium esculentum</i>	X	X		X			X		
<i>Pteris macilentata</i>	X	X					X	X	
<i>P. tremula</i>		O							
<i>Pyrrosia eleagnifolia</i>	X	X					X	X	
<i>Rumohra adiantiformis</i>	X	X					X	X	
<i>Tmesipteris elongata</i>		O	O						
<i>T. tannensis</i>	X	X						X	X
<i>Trichomanes endlicherianum</i>		O		O					
<i>T. reniforme</i>	X	X					X	X	X
<i>T. venosum</i>		X	O				O	X	
✱									
<b>Monocot herbs</b>									
<i>Acianthus sinclairii</i>		O	O						
<i>Agrostis capillaris*</i>	X	X	X	X	X	X			X
<i>Aira caryophyllea*</i>		X		X		X	X	X	X





Species	Walls		NBS		Records of Meurk & Ward 1993					
	1984	1994	Coast	-100	-200	-300	-400	-500	Summit	
<i>Echinopogon ovatus</i>	x	x								
<i>Ehrharta erecta*</i>		o		o						
<i>Eleocharis acuta</i>			x							
<i>Elymus solandri</i>	x	x	x		x	x	x			
<i>Festuca arundinacea*</i>		x	x							
<i>F. pratensis*</i>		o		o						
<i>F. rubra*</i>		x	x					o	x	
<i>Gahnia pauciflora</i>	x	x		o						
<i>G. setifolia</i>		o			o					
<i>G. xanthocarpa</i>		x		x		x				
<i>Gastrodia cunninghamii</i>		o								
<i>Glyceria fluitans*</i>		o	o							
<i>Hierochloe redolens</i>	o					o	o			
<i>Holcus lanatus*</i>		x	x			x	x	x	x	
<i>Hordeum marinum*</i>		o	o							
<i>H. murinum*</i>		x	x							
<i>Isolepis cernua</i>	x		x							
<i>I. nodosa</i>	x	x	x							
<i>I. praetextata</i>			x							
<i>I. sp.</i>				x						
<i>Juncus articulatus*</i>			x	x						
<i>J. bufonius*</i>		x	x					x		
<i>J. bulbosus*</i>		o		o						
<i>J. distegus</i>			x			x		x		
<i>J. effusus*</i>		x	x	x	x					
<i>J. filicaulis*</i>			x							
<i>J. gregiflorus</i>		x	x		x					
<i>J. krausii var australiensis</i>		x	x							
<i>J. pallidus</i>				x	x		x			
<i>J. planifolius</i>		x	x							
<i>J. sarophorus</i>			x							
<i>Lachnagrostis littoralis</i>		o	o							
<i>Lemna minor</i>		x	x							
<i>Lepidosperma australe</i>					x					
<i>Libertia grandiflora</i>		o								
<i>L. ixioides</i>	x	x		o	o		x			
<i>Lolium perenne*</i>		x	x			x				
<i>Luzula banksiana</i>	x	x	o	o		o				
<i>L. ?rufa</i>			x			x				
<i>Microlaena avenacea</i>	x	x					x	x		
<i>M. stipoides</i>		x	x	o						
<i>Microtis unifolia</i>		x		x				x		
<i>Orthocerus novae-zeelandiae</i>		x					x	x	x	

Species	Walls		NBS		Records of Meurk & Ward 1993				
	1984	1994	Coast	-100	-200	-300	-400	-500	Summit
<i>Paspalum ?dilatatum*</i>				X					
<i>Phormium cookianum</i>	X	X	X				O	X	
<i>P. tenax</i>		X	X						
<i>Poa annua*</i>		O	O	O					
<i>P. anceps</i>		X	O						
<i>P. cita</i>	X	X	X				X		X
<i>P. pratensis*</i>		O	O						
<i>P. pusilla</i>		O						O	O
<i>Prasophyllum colensoi</i>		O				O			
<i>Pterostylis alobula</i>	X	X							
<i>P. banksii</i>		O		O					
<i>P. graminea</i>	X	X		O					
<i>P. sp.</i>								X	X
<i>Rytidosperma gracile</i>		O					O		
<i>R. penicillatum*</i>		O	O						
<i>R. pilosum*</i>		O		O		O	O		
<i>R. racemosum*</i>		O							
<i>R. sp.</i>			X	X	X	X			X
<i>R. unarede</i>		O	O						
<i>Spirodela punctata*</i>		O		O					
<i>Sporobolus africanus*</i>		X	X	X	X	X			
<i>Stipa? sp.</i>						X			
<i>Thelymitra longifolia</i>		X				X			
<i>T. pauciflora</i>		O							
<i>Trisetum antarcticum</i>		O		O					
<i>T. drucei</i>		O		O					
<i>Triglochin striatum</i>		O	O						
<i>Typha orientalis</i>		O		O					
<i>Uncinia clavata</i>		O	O	O					
<i>U. filiformis</i>		O						O	O
<i>U. leptostachya</i>		O				O			
<i>U. ?filiformis</i>							X	X	
<i>U. ?rupestris</i> agg.		X					O	O	X
<i>U. silvestris</i>		O	O						
<i>U. scabra</i>		O	O		O				
<i>U. uncinata</i>		X	O	X			X	X	X
<i>Vulpia bromoides*</i>		X	X						X
<i>V. myuros*</i>		X		X				X	
<i>Zantedeschia aethiopica*</i>		X	X						
<b>Dicot herbs</b>									
<i>Acaena agnipila*</i>				X					
<i>A. anserinifolia</i>	X	O		X	X	X	X		X

Species	Walls		NBS		Records of Meurk & Ward 1993				
	1984	1994	Coast	-100	-200	-300	-400	-500	Summit
<i>A. novae-zelandiae</i> *		X	X	X	X	X			
<i>Achillea millefolium</i> *		O	O						
<i>Aciphylla squarrosa</i>	X	X		O			X		X
<i>Aegopodium podagraria</i> *		O	O						
<i>Anagallis arvensis</i> *		X	X		X				
<i>Apium graveolens</i> *		O		O					
<i>A. prostratum</i>	X	X	X						
<i>Arctium minus</i> *		X		X					
<i>Atriplex prostrata</i> *		X	X						
<i>Bellis perennis</i> *		X	X	X					
<i>Callitriche stagnalis</i> *		X	X	X			X	X	
<i>Calystegia soldanella</i>		X	X						
<i>Cardamine debilis</i> "long style"		X		X					
<i>C. hirsuta</i> *		O		O					
<i>Carduus tenuiflorus</i> *		O		O					
<i>Centaurium erythraea</i> *		X				X			
<i>Centella uniflora</i>		X	X	X		X	X	X	
<i>Cerastium fontanum</i> *		X	X				X		X
<i>Chenopodium glaucum</i>		X	X						
<i>Cirsium arvense</i> *	X	X	X					X	
<i>C. vulgare</i> *	X	X	X	X	X	X	X		
<i>Colobanthus apetala</i>		O	O						
<i>Conium maculatum</i> *		X	X						
<i>Conyza albida</i> *	X	X	O			X			
<i>Coronopus didymus</i> *		O	O						
<i>Cotula australis</i> *		X	X				X		
<i>C. coronopifolia</i>		O	O						
<i>Craspedia ?minor</i>	X	O	O						
<i>Crassula tetramera</i>		O	O						
<i>Crepis capillaris</i> *		O							
<i>Daucus carota</i> *						X			
<i>Dichondra brevifolia</i>				X	X	X			
<i>D. repens</i>	X	X	X	X	X	X	X		
<i>Digitalis purpurea</i> *	X	X	X	X	X	X	X		X
<i>Disphyma australe</i>	X	X	X						
<i>Einadia triandra</i>	X	X	X						
<i>Epilobium alsinoides</i>		X					X		
<i>E. brunnescens</i>									X
<i>E. ciliatum</i> *		O							
<i>E. cinereum</i>		O							
<i>E. komarovianum</i>								X	
<i>E. nummulariifolium</i>		X	X					X	
<i>E. rotundifolia</i>		X		X					

Species	Walls	NBS	Records of Meurk & Ward 1993					Summit
	1984	1994	Coast	-100	-200	-300	-400	
<i>Euphorbia lathyris</i> *		o		o				
<i>E. peplus</i> *		x	x					
<i>Euphrasia cuneata</i>		o				o		
<i>Foeniculum vulgare</i>	x			o				
<i>Fumaria bastardii</i> *		o	o					
<i>F. muralis</i> *		o	o					
<i>F. officinalis</i> *			x					x
<i>Galeopsis tetrahit</i> *		o	o					
<i>Galium aparine</i> *		o	o					
<i>G. murale</i> *		o	o					
<i>G. propinquum</i>		x	o				x	
<i>G. cf uliginosum</i> *			x			x	x	
<i>Geranium microphyllum</i>				x				x
<i>G. molle</i> *		x	o				x	
<i>G. robertianum</i> *		x	x					
<i>G. sessiliflorum</i>	x	x				x	x	x
<i>G. solanderi</i>			x	x				
<i>Gnaphalium audax</i>				x		x		
<i>G. coarctatum</i> *		x		o				
<i>G. sphaericum</i>	x	x	o					
<i>Gonocarpus aggregatus</i>		x				x	x	
<i>Haloragis erecta</i>	x	x	x	x				
<i>Helianthus x laetiflorus</i> *		o	o					
<i>Helichrysum filicaule</i>	x	x				x	x	x
<i>Hydrocotyle elongata</i>		x	o					x
<i>H. heteromeria</i>		o	o					
<i>H. moschata</i>		x	x	x	x	x	x	x
<i>H. novae-zeelandiae</i>		x		x				x
<i>Hypericum humifusum</i> *		x						
<i>H. japonicum</i>				x	?		?	?
<i>Hypochoeris glabra</i> *			x					
<i>H. radicata</i> *		x	x	x	x	x		x
<i>Kirkianella novae-zelandiae</i>		o	o					
<i>Lagenifera cuneata</i>							x	
<i>L. pumila</i>		x		x		o		x
<i>Lamium purpureum</i> *		o	o					
<i>Lathyrus latifolius</i> *		x	x					
<i>Lepidium pseudotasmanicum</i> *		o		o				
<i>L. sp.</i> *			x					
<i>Linum bienne</i> *		o		o				
<i>L. monogynum</i>	x	x	x					
<i>Lobelia anceps</i>	x	x	x					
<i>Lotus pedunculatus</i> *		x	x					

Species	Walls		NBS		Records of Meurk & Ward 1993				
	1984	1994	Coast	-100	-200	-300	-400	-500	Summit
<i>Lycopersicon esculentum</i> *				X					
<i>Malva ?neglecta</i>		X	O		X				
<i>Marrubium vulgare</i> *	X	X	X	O	X	O	X		
<i>Melilous officinalis</i> *		X	X						
<i>Mentha cunninghamii</i>		X							
<i>M. pulegium</i> *		X	X	X					
<i>M. spicata</i> *		O	O						
<i>Microseris scapigera</i>		O							
<i>Mimulus guttatus</i> *		X	X						
<i>Mycelis muralis</i> *		X					X	X	X
<i>Myosotis laxa</i> *		O		O					
<i>M. sylvatica</i> *		O	O						
<i>Navaretia squarrosa</i> *		X	X	X			X		
<i>Nertera depressa</i>	X	X	X						
<i>N. setulosa</i>		X		X					
<i>N. villosa</i>		X					X	X	X
<i>Orobanche minor</i> *		O	O						
<i>Oxalis corniculata</i> *		O	O	O					
<i>O. debilis</i> *		O							
<i>O. exilis</i>		X	X	X	X			X	X
<i>O. pink sp.*</i>		X	X						
<i>Parietaria debilis</i>	X	X	O						
<i>Pelargonium inodorum</i>		O	O						
<i>Peperomia urvilleana</i>	X	X	O						
<i>Physalis peruviana</i> *	X	X	X	X					
<i>Picris hieracioides</i> *		O	O						
<i>Plantago australis</i> *		X	X						
<i>P. coronopus</i> *		X	X						
<i>P. lanceolata</i> *		X	X						
<i>P. major</i> *		X	X						
<i>P. raoulii</i>		X	X				X	X	
<i>P. spathulata</i>		O	O						
<i>Polycarpon tetraphyllum</i> *		X	X				O	X	
<i>Polygonum hydroppiper</i> *		O	O						
<i>Prunella vulgaris</i> *		X	X	X		X			
<i>Pseudognaphalium "coast"</i>	X?	O	O						
<i>P. luteoalbum</i>			X					r	
<i>Ranunculus acaulis</i>		X	X						
<i>R. multiscapus</i>				X					
<i>R. reflexus</i>		X	X	X		X	X	X	X
<i>R. repens</i> *		X	X	X					
<i>Raoulia glabra</i>		O						O	
<i>Reseda luteola</i> *		O		O					

Species	Walls		Records of Meurk & Ward 1993						
	1984	NBS 1994	Coast	-100	-200	-300	-400	-500	Summit
<i>Rorippa microphylla</i> *			X						
<i>R. nasturtium-aquaticum</i> *		X	X						
<i>Rumex acetosella</i> *	X	X		O	O	O	O		
<i>R. brownii</i> *		O	O						
<i>R. conglomeratus</i> *		O		O	O	O	O		
<i>R. crispus</i> *		X	X						
<i>R. acetosella</i> *		X		X	X	X	X		X
<i>R. pulchra</i> *			X						
<i>Sagina apetala</i> *		O							
<i>S. procumbens</i> *	X	X	X	X			X		
<i>Samolus repens</i>	X	X	O						
<i>Sarcocornia quinqueflora</i>	X	X	O						
<i>Scleranthus biflorus</i>		X	X						
<i>Schizeilema trifoliatum</i>		O						O	O
<i>Selliera radicans</i>	X	X	X						
<i>Senecio bipinnatisectus</i> *		X	O	X					
<i>S. jacobea</i> *	X	X	O	X		X	X	X	
<i>S. lautus</i>	X	X	O						
<i>S. minimus</i>		O	O		X	X		X	X
<i>S. rufiglandulosus</i>		X					X	X	
<i>S. scaberulus</i>		O							
<i>S. sp.</i>								X	
<i>S. sterquilinus</i>		O	O						
<i>S. vulgaris</i> *		X	O			X			
<i>S. wairauensis</i>		X	O						
<i>Sherardia arvensis</i> *		O		O					
<i>Silene gallica</i> *		O	O						
<i>Silybum marinum</i> *			X				X		
<i>Sisymbrium officinale</i> *			X						
<i>Solenogyne gunnii</i> *			X						
<i>Solanum nigrum</i> *	X	X	X	X					
<i>S. tuberosum</i> *	X	X	O						
<i>Sonchus arvensis</i> *		O	O						
<i>S. asper</i> *		X	X						
<i>S. kirkii</i>	X	X	O						
<i>S. oleraceus</i> *		X	X						
<i>Spergularia rubra</i> *		O	O						
<i>Stellaria decipiens</i>	X	X					X	X	X
<i>S. media</i> *		X	O				X		
<i>Suaeda novae-zelandiae</i>	X	X	O						
<i>Taraxacum officinale</i> *		X	X						
<i>Tetragonia trigyna</i>		X	O						
<i>Trifolium dubium</i> *		O	O						

Species	Walls	NBS	Records of Meurk & Ward 1993						
	1984	1994	Coast	-100	-200	-300	-400	-500	Summit
<i>T. pratense</i> *		o	o						
<i>T. repens</i> *		x	o	x	x		x		
<i>T. subterraneum</i> *			x		x			x	
<i>T. ?uniflorum</i> *			x						
<i>Urtica dioica</i>		o	o						
<i>U. urens</i> *		x	x						
<i>Verbascum thapsus</i> *	x	x	x						
<i>V. virgatum</i> *		o							
<i>Vicia angustifolia</i> *			x		x	x			
<i>V. lathyroides</i> *	x	x	o						
<i>Viola cunninghamii</i>								x	
<i>Vittadinia cuneata</i> *		o			o				
<i>Wahlenbergia ?violacea</i>	x		x				x	x	x
<b>Trees, Shrubs, Vines</b>									
<i>Alectryon excelsus</i>	x	x		o/sd	o		x	sd	
<i>Aristotelia serrata</i>	x	x		x		o		x	x
<i>Alseuosmia pusilla</i>		x					o		
<i>Beilschmedia tawa</i>	x	x	o	x	o		x	x	x
<i>Brachyglottis repanda</i>	x	x		x		x	x	x	x
<i>Calystegia tuguriorum</i>	o	x		o					
<i>Carmichaelia australis</i>	x	x		o			o		
<i>Carpodetus serratus</i>	x	x		x		x	x	x	x
<i>Clematis fosteri</i> agg.	x	x		o					
<i>C. paniculata</i>	x	x				x		x	
<i>C. vitalba</i> *		o	o						
<i>Coprosma areolata</i>		x		o			x	x	
<i>C. crassifolia</i>		o	o				o		
<i>C. foetidissima</i>	x	x					o	sd	x
<i>C. grandifolia</i>	x	x					o	x	x
<i>C. lucida</i>	x	x	x			x			x
<i>C. propinqua</i>	x	x	x	x				x	x
<i>C. repens</i>	x	x	x	x					
<i>C. rhamnoides</i>	x	x	x	x		x	x	x	x
<i>C. robusta</i>	x	x	x			x	x		
<i>C. rotundifolia</i>		x						x	x
<i>Cordyline australis</i>	x	x	o				x		x
<i>C. banksii</i>	x	x						o	
<i>Coriaria arborea</i>	x	x	x						
<i>Corynocarpus laevigatus</i>	x	x	x						
<i>Cupressus macrocarpa</i> *			x						
<i>Cyathodes juniperina</i>	x	x				x	x		
<i>Cytisus scoparius</i> *		x						x	



Species	Walls		Records of Meurk & Ward 1993						
	1984	NBS 1994	Coast	-100	-200	-300	-400	-500	Summit
<i>Dacrydium cupressinum</i>		x				x	x		
<i>Discaria toumatou</i>	x	x			x		x		
<i>Dodonaea viscosa</i>	x	x							
<i>Dracophyllum longifolium</i>	x	x					o		
<i>Dysoxylum spectabile</i>	x	x		x			x	sd	
<i>Elaeocarpus dentatus</i>	x	x		x		sd	x	x	x
<i>Erica lusitanica*</i>	x	x		x	x	x			
<i>Freycinetia baueriana</i>	x	x		x			x		
<i>Fuchsia excorticata</i>	x	x		x			o	x	x
<i>F. perscandens</i>							x		
<i>Gaultheria antipoda</i>		o					o		
<i>Griselinia littoralis</i>	x	x					x	x	x
<i>G. lucida</i>	x	x		x			x		
<i>Hebe "arborea"</i>	x	x	o				x		
<i>H. stricta</i>	x	x	x	o			o	x	x
<i>Hedycarya arborea</i>	x	x		x			x	x	x
<i>Hoheria populnea</i> var <i>lanceolata</i>	x	x					o		
<i>Kunzea ericoides</i>	x	x	x	x	x	x	o	x	x
<i>Laurelia novae-zelandiae</i>	x	x		o	o				
<i>Leptospermum scoparium</i>	x	x	x	x	x	x	x		x
<i>Leucopogon fasciculatus</i>	x	x				x	x		
<i>L. fraseri</i>		x	o	x	x	x			
<i>Lophomyrtus bullata*</i>	x	x	o	x				x	
<i>L. bullata</i> x <i>obcordata</i>	o				o				
<i>L. obcordata</i>	o				o				
<i>Macropiper excelsum</i>	x	x		x			x		
<i>Melicope ternata</i>	x	x		x					
<i>Melicytus crassifolius</i>		o					o		
<i>M. ramiflorus</i>	x	x		x		x	x	x	x
<i>Metrosideros diffusa</i>	x	x		x			x	x	x
<i>M. excelsa*</i>		o	o						
<i>M. fulgens</i>	x	x		x			x	x	x
<i>M. perforata</i>	x	x	o	o	o	o			
<i>M. umbellata</i>	x	x							x
<i>Muehlenbeckia australis</i>	x	x		x			x	x	x
<i>M. complexa</i>	x	x				x	x		
<i>Myoporum laetum</i>	x	x	x	x					
<i>Myrsine australis</i>	x	x		x	o	x	x	o	
<i>M. salicina</i>	x	x						x	x
<i>Neomyrtus pedunculatus</i>		x							
<i>Nothofagus fusca</i>	x	x					o		
<i>N. solandri</i>	x	x			x	x	x	x	
<i>N. truncata</i>	x	x					o		

Species	Walls		NBS		Records of Meurk & Ward 1993				
	1984	1994	Coast	-100	-200	-300	-400	-500	Summit
<i>Olearia paniculata</i>	x	x	x						x
<i>O. rani</i>	x	x		x			x	x	x
<i>O. solandri</i>	x	x	x	x	x	x	x	x	x
<i>Ozothamnus leptophylla</i>	x	x	x	x	x	x	x	x	x
<i>Parsonsia capsularis</i>	x	x					o		
<i>P. heterophylla</i>	x	x		x				x	x
<i>Passiflora tetrandra</i>	x	x		x					
<i>Pennantia corymbosa</i>	x	x		x		x	x	x	x
<i>Pimelea prostrata</i>	x	x		o					
<i>Pinus radiata*</i>	x	x	x	x					
<i>Pittosporum eugenioides</i>		x		x			x		
<i>P. tenuifolium</i>	x	x					x	sd	
<i>Plagianthus divaricatus</i>		x	r						
<i>Podocarpus hallii</i>	x	x					x	x	x
<i>P. totara</i>				x					
<i>Populus nigra</i>	x			o					
<i>Prumnopitys ferruginea</i>	x	x				x	x	x	x
<i>P. taxifolia</i>	x	x					x	x	
<i>Pseudopanax arboreus</i>	x	x	x	x		sd	x	x	x
<i>P. colensoi</i>		x							x
<i>P. crassifolius</i>	x	x		x		x	x	x	
<i>P. ferox</i>	o	x		o					
<i>Pseudowintera axillaris</i>	x	x					x	x	x
<i>P. colorata</i>		x					x	x	x
<i>Raukaua anomalus</i>	x	x					x	x	x
<i>R. edgerleyi</i>	x	x					x	x	x
<i>Rhopalostylis sapida</i>	x	x		x	x	x			
<i>Ripogonum scandens</i>	x	x		x			x		x
<i>Rubus australis</i>	o	x			o				
<i>R. cissoides</i>		x					x	x	x
<i>Schefflera digitata</i>	x	x		o			x	x	
<i>Solanum aviculare</i>		x					o		
<i>Sophora microphylla</i>	x	x	sd						
<i>Streblus banksii</i>	x	x	o						
<i>S. heterophyllus</i>		x					x		
<i>Tupeia antarctica</i>	x	x	o						
<i>Ulex europaeus*</i>	x	x	x	x	x	x	x	x	
<i>Urtica ferox</i>	x	x	x	x	o	o	x		
<i>Vinca major*</i>		x	x						
<i>Vitex lucens*</i> (planted)			x						
<i>Weinmannia racemosa</i>	x	x					x	x	x



Species	Walls	NBS	Records of Meurk & Ward 1993						
	1984	1994	Coast	-100	-200	-300	-400	-500	Summit
<i>Stereocaulon ramulosum</i>							x		x
<i>Sticta latifrons</i>									x
<i>Stokesiella praelonga</i>				x					
<i>Teloschistes</i> sp.						x			
<i>Tephromella atra</i>							x		x
<i>Thuidium furfurosum</i>					x		x		x
<i>Triquetrella papillata</i>				x					
<i>Usnea</i> sp.						x		x	x
<i>Verrucaria maura</i>			x						
<i>Weymouthia cochlearifolia</i>								x	
<i>W. mollis</i>									x
<i>Xanthoparmelia mougeotina</i>						x			
<i>X.</i> sp.							x		
<i>Xanthoria ligulata</i>			x						

**Table 3: Bird, reptile and feral mammal sightings (or sign)**

Note: x - overall island records of GYW and CDM/JCW; o - altitudinal data from GYW

Species	Walls		Records of Meurk & Ward 1993					Summit
	1984	Coast	-100	-200	-300	-400	-500	
australasian harrier	x		o	o	o	o	o	
bellbird	x		o	o	o	o	x	x
blackbird	x		o	o	o	o	o	
black capped tern		x						
blue penguin	x	o						
brown creeper	x				o	o	o	o
chaffinch	x		o	o	o	o	o	
fantail	x	o	x	o	o	o	o	o
fantail (black)			x					
fluttering shearwater	x	o						
gannet	x	x						
giant petrel	x	o						
goldfinch	x		o	o	o	o		
greenfinch	x		o	o	o	o		
gull, black backed	x	x						
gull, red billed	x	x						
hedge sparrow (duncock)	x		o	o	o			
kereru	x		x	o	o	x		
kingfisher	x	o	o	o				
morepork	x		o	o	o	o	o	
nz falcon	x		o	o	o	o	o	o
oyster catcher (black)		x						
paradise shelduck		x						
pipit	x	x	o	o	o	o	o	o
pukeko		x	x					
redpoll	x		o	o	o	o	o	o
rifleman	x			o	o	o	o	o
riroriro/SI robin	x		o	o	o	o	o	
shag black/little		x						
silveryeye	x		o	o	o	o	o	o
skylark	x		o	o				
SI kaka	x						o	
spotted shag	x	o						
spurwing plover		o	o					
starling	x	o	o	o				
thrush	x		o	o	o			
tomtit	x		o	o	o	o	x	o
tui	x		x	o	o	o		
white faced heron		x						
white fronted tern	x	o						

Species	Walls		Records of Meurk & Ward 1993					Summit
	1984	Coast	-100	-200	-300	-400	-500	
weka	x	x	x	o	o	x	o	o
yellowhammer	x		o	o	o	o	o	o
forest gecko	x				o			
green gecko	x			o				
pacific gecko	x			o				
cattle	x	x	x	o	x	x	x	
goat	x	x	x	x	o	o	o	o
hedgehog	x	o	o	o				
mouse	x	o	o	o	o	o		
pig	x	o	x	o	o	x	x	o
red deer	x	o	o		o	o	o	o
sheep	x	x	x	o	o	o	o	x

### CORRECTIONS

In C.B.S.J. No. 31, 1996, on p. 28, 5<sup>th</sup> paragraph, the date for Garnock-Jones, P. and Elder, R. on *Coprosma pseudocuneata* should be 1996.

In C.B.S.J. No 32, 1998, on p. 48, 2<sup>nd</sup> paragraph, the authority given for first publication of the generic name *Cordyline* is incorrect. It should be (Commerson) R. Brown 1810.